

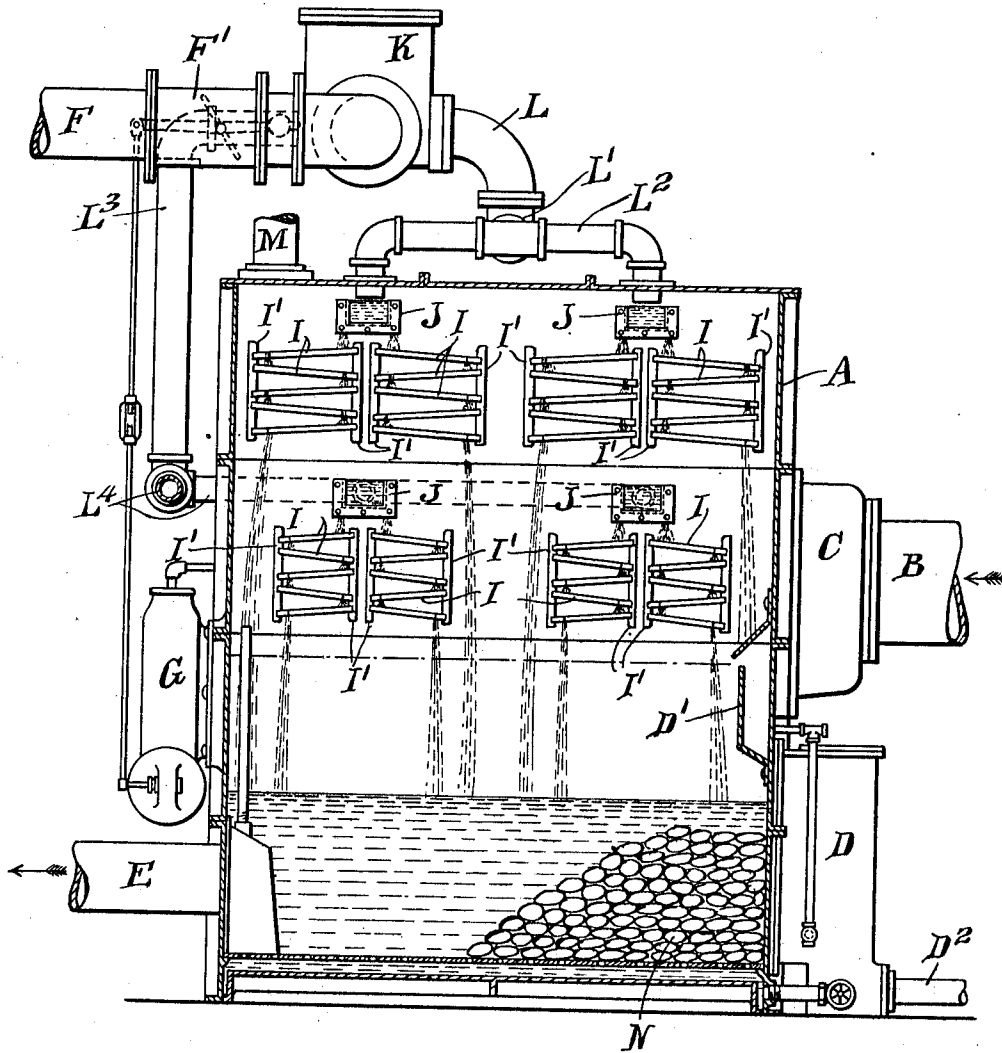
J. W. GAMBLE.  
WATER HEATER.  
APPLICATION FILED SEPT. 29, 1910.

991,969.

Patented May 9, 1911.

2 SHEETS—SHEET 1.

FIG. 1.

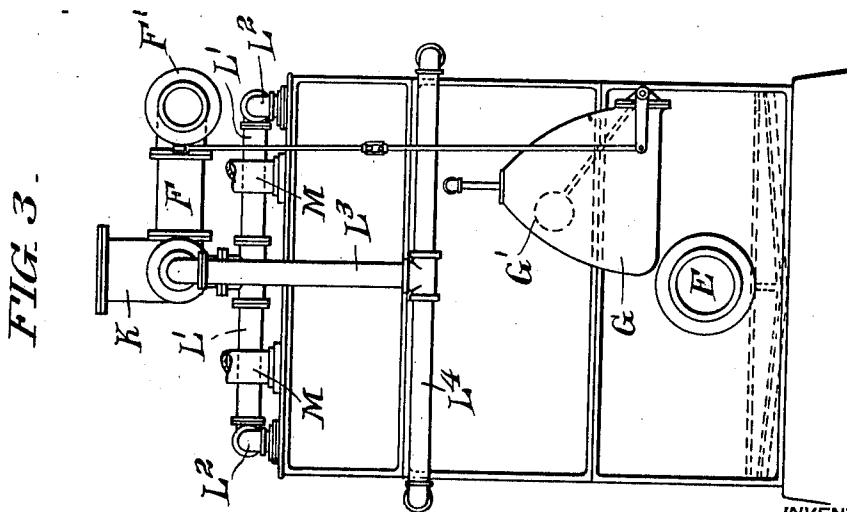
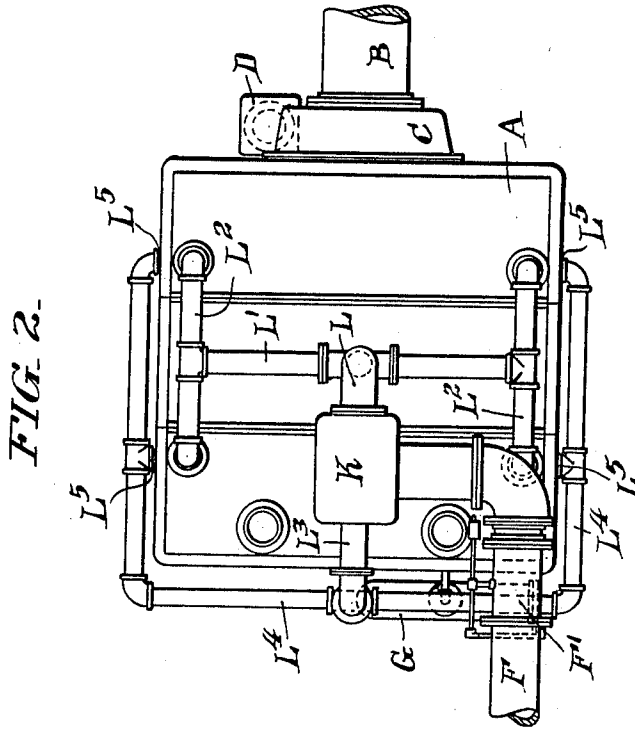


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991,969.

Patented May 9, 1911.  
 2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

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## WATER-HEATER.

991,969.

Specification of Letters Patent.

Patented May 9, 1911.

Application filed September 29, 1910. Serial No. 584,394.

*To all whom it may concern:*

Be it known that I, JOSEPH W. GAMBLE, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Water-Heaters, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My present invention relates to water heaters, and particularly to water heaters of the kind commonly known as open feed water heaters, used for heating water for boiler feed purposes, and the like. In this type of heater a heating chamber is provided into which the water to be heated and the steam for heating it are both admitted, suitable overflow connections being provided to insure the presence at all times of a steam space in the upper portion of the chamber, the water to be heated being made to pass through the steam space of the chamber in film like and broken streams by water spreading devices, usually in the form known as "trays", arranged above the water level in the heating chamber, and over which the water flows in film like streams, and from the discharge edges of which the water falls in broken streams.

The object of my invention is to provide a tray and water supply connection arrangement in a heater of the kind specified which will result in an increased capacity of the heater without a corresponding increase in the size and cost of construction of the heater as a whole. This I accomplish by locating the trays, or more accurately, groups of trays which I call "tray units" at different levels and so arranging them that the falling streams of water discharged from the upper trays or tray units do not fall onto the lower units, and by the provisions which I make for distributing the water to be heated with the desired uniformity, between the various trays or tray units.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of these specifications, but for a better understanding of the invention, however, and the advantages possessed by it, reference may be had to the accompa-

nying drawings and descriptive matter, in which I have illustrated and described one of the forms in which the invention may be embodied.

Of the drawings, Figure 1 is a sectional elevation of an open feed heater, Fig. 2 is a plan and Fig. 3 is an elevation taken at right angles to Fig. 1.

In the drawings, A represents the tank or body of the heater.

B is the steam supply pipe connected to the tank A through its usual oil separator C.

D, D<sup>1</sup> and D<sup>2</sup> represent the overflow waste connections by which the water in the tank is prevented from rising above the desired level, and E represents the service discharge connection through which the heated water is conveyed away from the heater.

F represents the main cold water supply pipe, and F<sup>1</sup> a valve therein controlled automatically by the float G<sup>1</sup> in the float box G, the arrangement of the float and valve being such that the valve is automatically closed when the water level in the tank rises to a predetermined level and is opened when the water falls below this level.

The cold water supply pipe F discharges into a dividing box or receptacle K from which it flows through connections hereinafter described, to the trays I, arranged in groups, which I call tray units. As shown there are five trays I, arranged one above another in each tray unit, each tray engaging and being supported by a pair of parallel tray supports I<sup>1</sup>. The adjacent trays in each unit are oppositely inclined to the horizontal and the water flowing over each tray of the unit, except the lowermost one, falls from the lower edge of the tray onto the tray beneath at the upper edge of the latter. As shown, the tray units, are arranged in pairs, with the upper edges of the upper trays of each pair of units adjacent and parallel, and beneath the cold water distribution boxes J.

In so far as above described, the heater with the adjuncts mentioned, is identical with heaters which have long been known and in common use, and on this account I have not thought it necessary to more specifically describe the details of construction of the parts referred to.

M represent vent connections for escape of

air and excess uncondensed vapor from the tank, and N represents filter material in the bottom of the tank.

The apparatus disclosed differs, however, from that before known in the arrangement of the various tray units and in the arrangement of the connections between the external distribution box K and the various internal distribution boxes J. Heretofore it has always been the practice, so far as I am aware, to arrange the similar tray units of a heater of this character at the same level, but in constructing a heater in accordance with the present invention, I locate the tray units at different levels and so construct and arrange the tray units that the falling streams discharged from the upper tray units do not fall on the lower units.

In the construction shown in the drawings, the tray units are located at two levels, with each pair of tray units in the upper tier directly above a pair of units in the lower tier, but in the particular construction shown, the trays in the upper units are wider than the trays in the lower units, so that the discharge corners of each group pair of tray units at the upper level are placed farther apart than, and are laterally displaced from the corresponding discharge corners of the tray units at the lower level. With this arrangement the falling streams of water discharged from the upper and lower tray units are laterally displaced from one another, and the streams from the upper tray units do not fall on to the lower tray units.

One characteristic of the present invention is the provision of cold water supply connections to the tray units located at different levels, which will insure a proper distribution of the water to be heated to the various tray units. In the particular construction shown in the drawings, the upper tray units are supplied with water by means of a pipe L, which leads from the dividing tank or box K to a horizontal pipe L' connected at its ends to two transverse pipes L<sup>2</sup>, discharging at their ends into ends of the boxes J, located above the upper units. As shown, there is one box J for each group pair of upper tray units, and each box J is supplied with water at one end from one, and at the other end from the other of the transverse pipes L<sup>2</sup>. The lower tray units are supplied with water by a pipe L<sup>3</sup>, leading from the dividing box K to the pipe L<sup>4</sup>, which runs around three sides of the tank A, and is connected at opposite sides of the tank by short pipes L<sup>5</sup> to the ends of the boxes J, located one above each pair of lower tray units.

By arranging the tray units at a different level, in accordance with the present invention, I am enabled to very greatly increase the capacity of the heater, particularly

where the amount of water to be heated is relatively large, without other change in the heater proper except a slight increase in the volume of the steam space, and without increasing the number of adjuncts to the heater, or indeed, with but little if any increase in the size of these adjuncts. The construction disclosed is, moreover, simple, effective and reliable, and the use of the invention involves but a slight departure from established practice in construction of heaters of the type to which the invention pertains. Aside from the tank body, which ordinarily should be slightly greater, when my invention is employed than heretofore, and the pipe connections from the dividing box to the internal overflow supply box of the heater, a heater may be constructed in accordance with my invention from the stock parts constructed and assembled as use on heaters as heretofore constructed.

While in accordance with the provisions of the statutes, I have herein described and illustrated the best form of my invention now known to me, it will readily be apparent to those skilled in the art that changes may be made in the form of the disclosure without departing from the spirit of my invention, and I do not wish the claims hereinafter made, to be limited to the particular form of apparatus disclosed, more than is made necessary by the prior state of the art.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. In a water heater of the kind specified the combination with the heating tank and the steam supply and water discharge connections therefor, of two tray units located in said tank at different levels, and so arranged that the stream of water discharged from the upper tray unit falls at the side of the lower unit, and separate cold water supply connections for said tray units.

2. In a water heater of the kind specified the combination with the heating tank and the steam supply and water discharge connections therefor, of two tray units located in said tank at different levels, one overlying the other, but arranged so that the falling streams of water discharged from the upper tray units falls at the side of the lower tray unit, and separate cold water supply connections for said tray units.

3. In a water heater of the kind specified the combination with the heating tank and the steam supply, and water discharge connections therefor, of water spreading tray units at different levels with separate cold water supply connections for the units at the different levels, the tray units at the different levels being so relatively arranged that the falling streams of water discharged from the upper tray units at each level do not fall on the lower tray units.

4. In a water heater of the kind specified the combination with the heating tank and the steam supply and water discharge connections therefor, of water spreading tray  
5 units located in the tank at different levels and arranged in pairs, extending side by side and discharging at their opposite lower edges, each pair of tray units at the upper level being centrally placed above a grouped  
10 pair of tray units at the lower level, and the discharge edges of each grouped pair of tray units in the upper level being separated by a distance greater than the distance between the discharge edges of the group  
15 pair of tray units beneath, whereby the streams of water discharged from a grouped pair of upper tray units fall at the opposite sides of the underneath grouped pair of tray units, and a separate cold water supply  
20 connection for each grouped pair of tray units.

5. In a water heater of the kind specified the combination with the heating tank and the steam supply and water discharge connections therefor, of water spreading tray  
25 units located in the tank at different levels, which discharge at their lower edges, and are arranged so that the water discharged from the unit or units at their upper level falls at the side of each unit at a lower level,  
30 and separate cold water supply connections for the tray units at different levels, the cold water supply connections for the unit or units at the lower level comprising pipe  
35 connections passing through the tank wall at opposite ends of the tray unit or units at that level.

JOSEPH W. GAMBLE.

In the presence of—

ROBERT G. CLIFTON,  
W. ATWOOD MEHARG.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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